

# **LONGBOW'S RENDEZVOUS WITH DESTINY: TASK ORGANIZING FOR EFFECTIVE AIR ASSAULT SECURITY**

**A MONOGRAPH  
BY  
Major David R. Moore  
Aviation**

**School of Advanced Military Studies  
United States Army Command and General Staff  
College  
Fort Leavenworth, Kansas**

**First Term AY 98-99**

Approved for Public Release Distribution is Unlimited

19990804 078  
840

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)			2. REPORT DATE 16 DECEMBER 1998		3. REPORT TYPE AND DATES COVERED MONOGRAPH	
4. TITLE AND SUBTITLE <i>LONGBOW'S RENDEZVOUS WITH DESTINY: TASK ORGANIZING FOR EFFECTIVE AIR ASSAULT SECURITY</i>			5. FUNDING NUMBERS			
6. AUTHOR(S) MAJOR DAVID R. MOORE						
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) SCHOOL OF ADVANCED MILITARY STUDIES COMMAND AND GENERAL STAFF COLLEGE FORT LEAVENWORTH, KANSAS 66027			8. PERFORMING ORGANIZATION REPORT NUMBER			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) COMMAND AND GENERAL STAFF COLLEGE FORT LEAVENWORTH, KANSAS 66027			10. SPONSORING/MONITORING AGENCY REPORT NUMBER			
11. SUPPLEMENTARY NOTES						
12a. DISTRIBUTION/AVAILABILITY STATEMENT <i>APPROVED FOR PUBLIC RELEASE DISTRIBUTION UNLIMITED.</i>				12b. DISTRIBUTION CODE		
13. ABSTRACT (Maximum 200 words) <i>SEE ATTACHED</i>						
14. SUBJECT TERMS AIR ASSAULT FORCE PROTECTION			COMBAT AIRCRAFT HELICOPTERS		15. NUMBER OF PAGES 50	
					16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED		18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED		19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED		20. LIMITATION OF ABSTRACT UNLIMITED

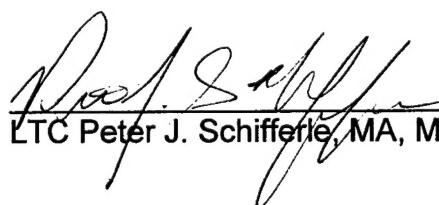
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

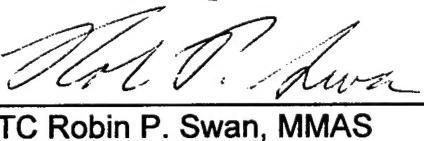
Major David R. Moore

Title of Monograph: *Longbow's Rendezvous With Destiny: Task Organizing for Effective Air Assault Security*

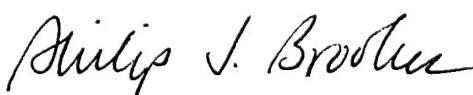
Approved by:

  
\_\_\_\_\_  
LTC Peter J. Schifferle, MA, MMAS

Monograph Director

  
\_\_\_\_\_  
LTC Robin P. Swan, MMAS

Director, School of Advanced  
Military Studies

  
\_\_\_\_\_  
Philip J. Brookes, Ph.D.

Director, Graduate Degree  
Program

Accepted this 16th Day of December 1998

## **ABSTRACT**

### **LONGBOW'S RENDEZVOUS WITH DESTINY: TASK ORGANIZING FOR EFFECTIVE AIR ASSAULT SECURITY by MAJ David R. Moore, USA, 50 Pages**

The attack helicopter battalions within the 101<sup>st</sup> Airborne Division (Air Assault) sequentially transition to the AH-64D beginning January 1999 and lasting through May 2002. During this period, air assault operations will be conducted with three types of combat aviation aircraft: AH-64A Apaches, AH-64D Longbows, and OH-58D(I) Kiowa Warriors. The division's challenge is to effectively task organize these different aircraft in ways that optimize and complement their unique capabilities.

This study proposed a task organization of combat aviation aircraft based upon the relative constants of doctrine, airframe capabilities and division TTP. The four courses of action (COA) analyzed and compared were: 1) COA "Apache", the division's traditional task organization of pure Apache teams; 2) COA "Longbow" a Longbow-pure task organization; 3) COA "Warrior/Apache", a task organization of Kiowa Warrior and Apache; and 4) COA "Warrior/Longbow", a task organization of Kiowa Warrior and Longbow. Each COA was applied to a general scenario using the division's current air assault security TTP and analyzed based upon three evaluation criteria: *situational awareness, complementarity, and preserving the force*.

The comparative analysis determined the most effective course of action to be COA "Warrior/Longbow." This study drew three conclusions: 1) properly task-organized air assault security teams have enormous potential to contribute to the division's situational awareness during air assault operations; 2) despite the AH-64D Longbow's technological enhancements, it still possesses weaknesses which can be mitigated by effectively task-organized security teams; 3) shared situational awareness and complementarity of aircraft capabilities significantly improves the force protection of the division's aircraft and the assaulting ground element.

This study identified three implications for the Air Assault Division: 1) task organizing air assault security teams requires deliberate forethought, training and continued discovery learning; 2) task organization reviews naturally result in employment TTP reviews; and 3) task organizations and TTP should be reassessed more frequently than a major force modernization initiative like the Longbow fielding.

## TABLE OF CONTENTS

<b>1.</b>	<b>Introduction.....</b>	<b>1</b>
<b>2.</b>	<b>Doctrine.....</b>	<b>5</b>
<b>3.</b>	<b>Combat Aviation Aircraft.....</b>	<b>9</b>
	AH-64A Apache.....	9
	OH-58D Kiowa Warrior.....	11
	AH-64D Longbow.....	13
<b>4.</b>	<b>Tactics, Techniques and Procedures (TTP).....</b>	<b>18</b>
	Air Assault Division Current TTP.....	18
	Emerging Longbow TTP.....	20
<b>5.</b>	<b>Options and Analysis.....</b>	<b>26</b>
	Evaluation Criteria.....	26
	General Scenario.....	27
	Courses of Action “Apache”.....	27
	Courses of Action “Longbow”.....	29
	Courses of Action “Kiowa/Apache”.....	30
	Courses of Action “Kiowa/Longbow”.....	32
	Comparison.....	34
	Recommendation.....	35
<b>6.</b>	<b>Conclusion.....</b>	<b>36</b>
	Summary.....	36
	Conclusions.....	38
	Implication.....	38
	<b>Endnotes.....</b>	<b>41</b>
	<b>Bibliography.....</b>	<b>47</b>

## CHAPTER 1 - INTRODUCTION

In November 1998, the 1<sup>st</sup> Cavalry Division fielded the U.S. Army's first AH-64D Longbow battalion. The 101<sup>st</sup> Airborne Division (Air Assault) is next. The Air Assault Division's three attack helicopter battalions sequentially transition to the AH-64D beginning January 1999 and lasting through May 2002.<sup>1</sup> During this extended Longbow fielding process, air assault operations will be conducted with three types of combat aviation aircraft: AH-64A Apaches, AH-64D Longbows, and OH-58D(I) Kiowa Warriors. The division's challenge will be to effectively task organize these different aircraft in ways that optimize and complement their unique capabilities. The question becomes: "how can the Air Assault Division most effectively task organization its combat aviation aircraft during air assault security missions once AH-64D Longbow fielding begins?"

The task of effectively integrating aircraft with diverse capabilities and limitations is not foreign to the Air Assault Division. Past air assault leaders have analyzed the best methods of employing such diverse combat aviation aircraft as AH-64A Apache, OH-58D(I) Kiowa Warrior, AH-1 Cobra, and OH-58C Kiowa. The technological gaps between generations of aircraft produced a variety of task organizations ranging from well-integrated teams with multiple types of aircraft to completely segregated teams of purely one type of aircraft. However, today's combat aviation aircraft are being designed with integration in mind, thus narrowing some technological gaps and encouraging more integrated task organizations. Longbow, Kiowa Warrior, and when fielded, Comanche are all equipped with systems that network tightly with not only sister aircraft, but with other ground, air and sea systems across the battlespace.

To maximize the synergistic effect of different types of aircraft, units should reevaluate the efficiency of their current task organizations as newly fielded system's introduce unique capabilities. As the 101<sup>st</sup> Airborne Division (Air Assault) fields AH-64D Longbow, it must decide how best to employ its combat aviation aircraft for all of its missions, and in particular during air assault security operations. By reassessing and, if necessary, adjusting its traditional task organization of combat aviation aircraft in the air assault security role, the Air Assault Division can better optimize each aircraft's unique capabilities while mitigating their limitations. These task organizations should result in greater situational awareness, complementary employment of combat aviation aircraft, and better protection of the division's forces during the conduct of an air assault.

The formula for determining the optimal task organization of combat aviation aircraft for an air assault security mission is highly complex and situational dependent. Among the many variables considered include: competing missions within the division; the enemy's location, composition and disposition; the distance of the air assault; the type of terrain over which the air assault occurs; and the resources available (assault forces, aircraft, time, fire support assets, etc.) to perform the mission. There are, however, some "relative constants" in this formula which include the doctrinal principles of employment, airframe capabilities, and to an extent, the tactics, techniques and procedures (TTP) used to standardize mission execution.<sup>2</sup> Recognizing the futility of analyzing every situational-dependent variable, this study proposes a task organization of combat aviation aircraft based upon the relative constants of doctrine, airframe capabilities and TTP. Furthermore, the overall size of the task organization is also situational dependent. This study does not identify the optimal composition of the entire air assault security task organization.

Instead, the proposed task organizations are building blocks with which units can develop their complete air assault security force based upon an analysis of all the variables associated with the mission.

Determining the optimal task organization of combat aviation aircraft for air assault security begins with a discussion of the relative constants: doctrine, combat aviation airframe capabilities, and TTP. Doctrine topics addressed include definitions of an air assault, phases of an air assault operation, air assault security, and the tasks assigned to combat aviation aircraft. An explanation of the second relative constant, combat aviation aircraft capabilities, includes the Air Assault Division's current aircraft, Apache and Kiowa Warrior, as well as the soon-to-be-fielded Longbow. Aircraft descriptions address capabilities as well as corresponding strengths and weaknesses. The discussion of the third relative constant, tactics, techniques and procedures, begins with the division's current TTP for air assault security and ends with some emerging Longbow TTP that apply to air assault operations.<sup>3</sup>

Four proposed courses of action (COA) describe some of the task organization options available to the 101<sup>st</sup> Airborne Division (Air Assault) for employing its combat aviation aircraft on air assault security missions from October 1999 to July 2001. COA "Apache" uses the division's traditional task organization of pure Apache teams to conduct air assault security. COA "Longbow" employs a Longbow-pure task organization for all air assault security tasks. COA "Warrior/Apache" proposes a task organization Kiowa Warrior and Apache. COA "Warrior/Longbow" uses a task organization of Kiowa Warrior and Longbow. Each course of action is applied to a general scenario using the division's current air assault security TTP.

The courses of action are then analyzed based upon three evaluation criteria: *situational awareness*, *complementarity*, and *preserving the force*. *Situational awareness* is the sharing of information to rapidly produce an accurate common operational picture.<sup>4</sup> *Complementarity* is the qualitative increase in effects caused by putting together two or more forces, each supplying what is lacking in the other, to create a more potent effect.<sup>5</sup> *Preserving the force* means taking all appropriate measures to preserve combat power for decisive action.<sup>6</sup> Each evaluation criteria is rated as either an advantage or disadvantage for the COA and then rank-ordered. The most effective task organization is selected from an overall comparison of courses of action by rank-ordered criteria. The study suggests some conclusions and implications that the 101<sup>st</sup> Airborne Division (Air Assault) may consider when it selects a task organization for air assault security missions in the future.

## CHAPTER 2 - DOCTRINE

The first “relative constant” in the task organization formula is doctrine. The doctrine applicable to air assault security missions forms the foundation for selecting the best task organization for the mission. Because of the uniqueness of air assault operations, it is important to understand its definition and characteristics. *FM 101-5-1, Operational Terms and Graphics* defines an air assault as an operation in which :

air assault forces (combat, combat support, and combat service support), use firepower, mobility, and total integration of helicopter assets in their ground or air roles to maneuver on the battlefield under the control of the ground or air maneuver commander in order to engage and destroy enemy forces or to seize and hold key terrain.<sup>7</sup>

Air assaults are highly mobile and complex operations characterized by large formations of aircraft flying brigade-size infantry task forces as far as 150 kilometers at speeds of 220 kilometers per hour.<sup>8</sup> For operational security, surprise, and self-protection, most air assaults are flown at night and at low altitudes (200 feet above the ground or less).<sup>9</sup> The enemy defends against air assaults with a variety of means, including small arms fire, air defense and convention artillery, surface-to-air missiles, fixed and rotary-wing aircraft, and reactionary or reserve forces. To counter these threats, air assault commanders employ combat aviation aircraft (attack and air cavalry helicopters) and other members of the combined arms team to provide air assault security. According to *FM 1-112, Attack Helicopter Operations*, “air assault security provides force protection for the air assault task force as it moves from PZs to LZs, as it accomplishes its ground tactical mission, and as it returns.”<sup>10</sup> Army doctrine assigns combat aviation aircraft in general the mission of providing air assault security. Air cavalry and attack helicopter units, in coordination with conventional fire support and other assets, set the conditions for success

before the air assault begins, and continue to provide supporting fires once the air assault force is established on the ground.<sup>11</sup>

In order to execute such a complex and dynamic mission as an air assault, the operation is normally divided into five phases: staging, loading, air movement, landing, and the ground tactical phase. These phases are conducted both sequentially and simultaneously throughout the duration of an air assault. As a component of the air assault security effort, combat aviation aircraft perform essential roles during each phase of the air assault.

The staging phase designates the arrival time of ground units (troops, equipment and supplies), the pick-up zone (PZ), and the proper order for movement.<sup>12</sup> During the staging phase, air assault security encompasses aerial reconnaissance and screening operations throughout the battlespace. Combat aviation aircraft gather critical information and begin setting the conditions necessary for a successful air assault. Aircraft conduct aerial reconnaissance of the proposed routes, PZs and LZs to determine suitability and enemy disposition.<sup>13</sup>

The loading phase includes the loading of troops, equipment, and supplies on the correct aircraft in the correct PZ at the appropriate time.<sup>14</sup> During the loading phase, leaders continue to employ combat aviation aircraft in order to check and set the conditions for the air assault. Combat aviation aircraft continue their reconnaissance to confirm or deny previous reports. These aircraft must relay the current route and LZ status to the Air Assault Task Force Commander (AATFC) in time to allow any necessary adjustment to the plan. Additionally, combat aviation aircraft provide PZ security during this vulnerable phase as troops and aircraft mass in their pickup zones.<sup>15</sup>

In the air movement phase, the Air Assault Task Force (AATF) conducts an air movement of troops, equipment, and supplies from the PZs to the landing zones (LZ) in accordance with the pre-determined time schedule and load plans.<sup>16</sup> During this phase, combat aviation aircraft coordinate the forward and rearward passage of lines for the air assault task force during cross-FLOT operations. Along the route, combat aviation aircraft suppress enemy fires by directing indirect fire, engaging from predetermined overwatch positions, or conducting hasty attacks while escorting the flight. They perform area reconnaissance of primary and alternate PZs, and relay the results to the Air Mission Commander and the AATFC prior to the arrival of the AATF.<sup>17</sup> If necessary, overwatching aircraft recommend adjustments to landing instructions based upon the developing situation. Additional roles during the air movement phase include reconnaissance of return routes, security of assault aircraft along return routes, and local protection for downed aircraft recovery operations.<sup>18</sup>

In the landing phase, elements sequence into the area of operations, ensuring that units arrive at designated locations and times prepared to execute the ground tactical phase.<sup>19</sup> During the landing phase, combat aviation aircraft provide security to the assault aircraft and the AATF by directing the suppression of forces in and around the LZ. Combat aviation aircraft use all available means including indirect fires, assigned close air support, long-range surveillance teams, assault aircraft door guns, and organic weapons in order to suppress enemy forces and protect the AATF as it lands. The assaulting force is extremely vulnerable during this phase, and actions on contact must be tightly coordinated to avoid friendly fire incidents.<sup>20</sup>

The ground tactical phase is the foundation of a successful air assault operation. It involves actions in the objective area that ultimately accomplish the mission.<sup>21</sup> The ground tactical phase begins when the AATF is inserted. Combat aviation forces provide security to the ground force by screening ground avenues of approach into the LZ to prevent enemy counterattacks, by engaging forces that enter the area of operation, and by directing fires against enemy forces in contact with the ground force. As in the landing phase, any close engagements by combat aviation must be meticulously coordinated between the aircraft and the ground force to reduce the possibility of fratricide. The ground tactical

Army Aviation doctrine assigns air assault security tasks to combat aviation aircraft in a flexible manner. Both attack helicopter and cavalry manuals address the task of air assault security. As an added measure of versatility, *FM 1-112 Attack Helicopter Operations* states that when cavalry assets are not available, attack helicopter units may also be required to plan for reconnaissance/security operations in support of the AATF. Likewise, when attack helicopter units are unavailable, air cavalry units may be required to plan attack operations.<sup>22</sup> Such open-ended doctrinal guidance allows commanders to task organize combat aviation assets in an adaptable, mission-oriented manner.

Doctrine, as a “relative constant” in the task organization formula, provides broad guidance and employment principles from which units can create tactics, techniques and procedures that accomplish the mission. Before developing TTP, units must first understand the means they have available to conduct the operation. One of the primary means the Air Assault Division has to execute an air assault security mission is its combat aviation aircraft: Apache, Kiowa Warrior, and soon, Longbow.

## **CHAPTER 3 - COMBAT AVIATION AIRCRAFT**

The second “relative constant” in the formula for determining the optimal task organization for an air assault security team is the combat aviation aircraft’s characteristics. Before deciding which combat aviation aircraft should perform what tasks in an air assault security mission, it is important to understand each airframe’s capabilities, and the resultant strengths and weaknesses. The combat aviation assets currently assigned to the Air Assault Division are the AH-64A Apache and the OH-58D(I) Kiowa Warrior. They are organized into three attack helicopter battalions, each containing twenty-four Apaches, and one cavalry squadron containing thirty-two Kiowa Warriors.<sup>23</sup> When fielded, the AH-64D Longbow will replace the Apache in the attack helicopter battalions.

The AH-64A Apache is an attack helicopter which possesses day, night, and limited adverse weather fighting capabilities. AH-64A’s typical cruise airspeed (120 knots or 222 kilometers per hour) and combat radius (200 kilometers) provide quick and responsive fires across a great distance. Additionally, when equipped with an external fuel tank in place of one weapons rack, Apache increases its station time by one hour. This capability also allows Apache to extend its combat radius out to 300 kilometers. Apache’s formidable arsenal of weapons – sixteen semi-active laser (SAL) Hellfire missiles or ninety-six 2.75” folding fin aerial rockets, and 1200 thirty-millimeter chain gun rounds -- can destroy a variety of armored, mechanized, vehicular or towed targets.<sup>24</sup> The aircraft’s laser range finder/designator provides ballistic solutions and terminal guidance for autonomous engagements or remote engagements with Kiowa Warrior, Longbow, artillery units firing Copperhead, and other systems that employ laser munitions.<sup>25</sup>

The Apache's optics -- day television (DTV), direct view optics (DVO) and forward-looking infrared (FLIR) -- provide target detection and magnification during day, night and marginal weather conditions. Additionally, an on-board recorder captures DTV and FLIR video for review by the crewmembers in flight, or for analysis by commanders and staff after the aircraft returns to base.<sup>26</sup> Apache's aircraft survivability equipment provides radar detection and warning, laser warning, infrared missile jamming, and radar jamming. Additionally, Apache's chaff/flare dispenser defends against radar threats and heat-seeking missiles. Apache's communications is limited to line-of-sight voice communications between aircraft and ground stations. The AH-64A cannot receive or transmit information digitally.<sup>27</sup>

As a result of these capabilities, the Apache possesses some noteworthy strengths and weaknesses. One AH-64A strength is its relatively fast cruise speed, allowing it to fly at an equal pace with assault aircraft (UH-60L Blackhawk and CH-47D Chinook), covering long distances quickly. Secondly, Apache's heavy ordnance payload allows it to destroy a large number of targets. Finally, external fuel tanks give Apache longer station time and the ability to fly farther in support an air assault operation.<sup>28</sup>

The Apache also possesses weaknesses. Apache's lack of digital communications limits its situational awareness sharing capabilities to face-to-face coordination and voice radio traffic. Secondly, the size of the Apache produces a relatively large visual, acoustic, infrared, and radar signature, reducing surprise and compromising operational security during the reconnaissance, security or movements to contact.<sup>29</sup> Another weakness is Apache's lack of a weapon designed to defend against fixed and rotary wing threats. Additionally, threat identification through the FLIR system is extremely difficult.

Although an AH-64A crew can easily find heat signatures of targets, it may not be able to determine friend or foe at ranges beyond three kilometers, resulting in engagement hesitation or fratricide.<sup>30</sup> Finally, the degradation of its laser/range finder caused by adverse weather and battlefield obscurants (smoke, dust, haze, fog) makes Apache's SAL Hellfire less effective during such conditions.<sup>31</sup>

The second combat aviation aircraft assigned to the division is the OH-58D(I) Kiowa Warrior, an armed reconnaissance helicopter with day and night fighting capabilities. Its cruise airspeed (100 knots) and combat radius (120 kilometers) allow it to reconnoiter large areas relatively quickly.<sup>32</sup> Kiowa Warrior cannot carry external fuel tanks to increase its station time and thereby extending its combat radius. For the armed reconnaissance mission, Kiowa Warrior carries a relatively light but versatile payload of weapons including a mix of SAL Hellfire missiles, 2.75" folding fin aerial rockets, a fifty-caliber machine gun and Air-To-Air Stinger (ATAS) missile. Its airframe limitations prevent it from carrying a significant ordnance load, thereby limiting its lethality.<sup>33</sup> Kiowa Warrior's laser range finder/designator supports weapon engagements and target designation for itself and other compatible systems like Apache, Longbow and Copperhead artillery.<sup>34</sup>

OH-58D(I)'s optics, Low-Light Television (LLT) and Thermal Imaging System (TIS), provide target acquisition, designation and image magnification during day, night and marginal weather conditions. Like Apache, OH-58D(I) can record video with the on-board recorder for in-flight or post-mission review. Kiowa Warrior employs the same defensive countermeasures as the Apache, with the exception of radar jamming and chaff/flare dispensing. An innate countermeasure of the OH-58D(I) is the airframe's smaller,

stealthier size. Designed for reconnaissance and security missions, the Kiowa Warrior presents a relatively small visual, acoustic, infrared, and radar signature.<sup>35</sup>

Kiowa Warrior receives and transmits information over the same line-of-sight radio systems as the Apache. However, OH-58D(I) is equipped with an Airborne Target Handover System (ATHS) that shares digital messages in TACFIRE-protocol with other ATHS aircraft or vehicles and with TACFIRE-compatible systems like Interim Fire Support Automated System (IFSAS) and Advanced Field Artillery Tactical Data System (AFATDS). ATHS can also receive and transmit TACFIRE-protocol between IDM-equipped aircraft such as the AH-64D Longbow and some U.S. Air Force close air support aircraft..<sup>36</sup> . Additionally, OH-58D(I) is equipped with the Photo-Telesis system that screen-captures images and transmits them over a secure radio back to a ground station for analysis.<sup>37</sup>

Kiowa Warrior's capabilities give it distinct strengths and weaknesses. One strength is its flexible armament payload, allowing it to configure against a variety of threats, fixed and rotary-wing aircraft. Second, the airframe's relatively smaller visual, acoustic, infrared, and radar signature make detection and targeting of the Kiowa Warrior more difficult during reconnaissance and security missions. Finally, Kiowa Warrior's digital communications and imagery capabilities provide a number of situational awareness sharing options.

OH-58D(I) has weaknesses as well. Its relatively slower cruise speed precludes it from flying as quickly as assault or attack helicopter formations. Second, its lack of external fuel tanks limits its potential range and station-time. Therefore, missions beyond the aircraft's combat radius require additional refueling locations in order to employ the Kiowa

Warrior. Third, due to its lighter ordnance loads, the Kiowa Warrior cannot destroy as many targets as an attack helicopters. Additionally, OH-58D(I) shares the same limitations as Apache in terms of the degradation of the laser designator and SAL Hellfire missile's effectiveness due to adverse weather and obscurations, as well as the difficulty of distinguishing friend or foe with the TIS at ranges beyond 3000 meters.<sup>38</sup>

The new combat aviation aircraft to be fielded in the division is the AH-64D Longbow, an improved variation of the AH-64A Apache. Longbow is equipped with a variety of enhancements in armament, optics, aircraft survivability equipment, and digital communications. These system improvements allow Longbow to fight not only under conditions of day, night and adverse weather, but now through battlefield obscurants.

The Longbow's flight characteristics are relatively the same as Apache in terms of speed, combat radius and external fuel tank capabilities. Longbow's armament enhancements are the fire-and-forget, radio frequency (RF) Hellfire missile for engagements through battlefield obscurants, and the heat-seeking Air-to-Air Stinger missile for fixed and rotary-winged engagements. Longbow continues to carry laser-guided SAL Hellfire missiles, 2.75" folding fin aerial rockets, the thirty-millimeter chain gun and the laser range finder/designator.<sup>39</sup>

The Longbow enhances its optics suite with the Fire Control Radar (FCR), a millimeter-wave radar system that detects, classifies, and prioritizes ground and air targets out to 8 kilometers during the day, at night, and through obscurants (fog, rain, dust, smoke).<sup>40</sup> The FCR transmits this targeting information to on-board RF Hellfire missiles for autonomous fire-and-forget engagements, or to a DWO for target assignments and engagement area sectoring. The FCR video can be captured on the aircraft's video

recorder and reviewed immediately by the crew, or digitally transmitted to a ground station module for near-real time analysis and situational awareness updates. Nine out of twenty-four Longbows assigned to a battalion are equipped with the Fire Control Radar.<sup>41</sup> For clarity, some Longbow manuals refer to AH-64D with FCR as “Delta Model With” (DWI), and AH-64Ds without FCR as “Delta Model Without” (DWO).<sup>42</sup> All Longbows, whether DWI or DWO, are equipped with the same optics suite as the Apache’s (DTV, DVO, FLIR).<sup>43</sup>

AH-64D improves upon the Apache’s aircraft survivability equipment with the addition of the Radar Frequency Interferometer (RFI), a 360-degree passive radar warning device that detects, classifies and direction-finds radar emitters. The RFI transmits the information to the FCR for target processing. Only DWI Longbows are equipped with the RFI. In addition to the RFI, Longbows also carry all the survivability equipment found on the Apache.<sup>44</sup>

Another major improvement is the Longbow’s digital capability through an Improved Data Modem (IDM). Across the same suite of radios as Apache, Longbow now sends common message sets (shot-at-files, present position report, free-text messages, and FCR targets-all), video, graphics and imagery to other AH-64Ds, the Common Ground Station, and the Longbow Ground Station.<sup>45</sup> The IDM can also receive and transmit digital messages with the Advanced Field Artillery Tactical Digital System (AFATDS) and the Air Force’s E-8C Joint Surveillance Target Attack Radar System (JSTARS). Finally, Longbow’s IDM can receive a limited set of digital messages from OH-58D(I)’s ATHS in TACFIRE protocol.<sup>46</sup>

As a situational awareness enhancement, Longbow operates a Tactical Situation Display (TSD) which depicts the aircraft's location in relation to all targets, graphic control measures, routes, obstacles and other essential elements. This situational "strip map" is initially developed during pre-mission planning by crewmembers using the Aviation Mission Planning System, then loaded into each aircraft through the Data Transfer Module. In flight, TSD information can be updated and shared between aircraft or other compatible ground stations via the IDM, facilitating improved situational awareness. In this way, the information off the TSD can help reduce the possibility of fratricide by displaying aircraft and friendly force positions in relationship to detected enemy targets.<sup>47</sup>

Longbow's improved capabilities translate into formidable strengths. Longbow shares the Apache's advantages in speed, heavy ordnance payloads, and external fuel tank capabilities. A unique Longbow strength is the Fire Control Radar enhances the aircraft's adverse weather reconnaissance and engagement capabilities. Another strength is the fire-and-forget RF Hellfire missile that allows the crew to engage and destroy ground and air targets at ranges in excess of eight kilometers without having to provide laser guidance to the missile. This greatly reduces aircraft exposure time, increases survivability, and mitigates the adverse effects of battlefield obscurants. Another strength is the Longbow's RFI, which when coupled with the FCR and RF Hellfire missiles, allows the crew to engage enemy air defense radar threatening the aircraft in seconds without having to visually acquire the target. The TSD is a strength, providing an excellent situation awareness capability which reduces the chances of friendly fire incidents. Finally, the Longbow's digital communications allows it to pass information and video to compatible systems, thus increasing situational awareness.<sup>48</sup>

In spite of its strengths, AH-64D still has weaknesses. First, despite the FCR's acquisition and categorization capabilities, it cannot identify a target as friend or foe. The crew must still visually identify the target through its traditional optics (DVO, DTV, and FLIR) or with the naked eye to positively distinguish between friendly and enemy targets.<sup>49</sup> Secondly, the FCR cannot determine the condition of a target, before or after the engagement. In order to gather a battle damage assessment (BDA) on RF Hellfire engagements, Longbow must employ another system other than the FCR such as the Longbow's traditional optics, an unmanned aerial vehicle, a second aircraft within the team, or a ground force.

Another weakness of the Longbow is the limited number of FCR-equipped aircraft (DWI) within the battalion -- nine out of twenty-four aircraft are DWIs. The FCR is one of the airframe's most significant improvements, upon which many of the enhanced capabilities (situational awareness, reconnaissance and engagement through adverse weather and obscurants, fire-and-forget Hellfire missiles) rely. DWIs are, in effect, a Longbow battalion's "center of gravity", that capability from which a force derives freedom of action and physical strength.<sup>50</sup> To preserve this highly valuable and limited asset, air assault security teams must prudently deploy and diligently protect its DWIs.<sup>51</sup> In addition to these Longbow-specific weaknesses, the AH-64D has some of the same weaknesses as the Apache: large visual, acoustic, infrared, and radar signature; degraded laser and SAL Hellfire missile performance in adverse weather and obscurants; and difficulties identifying targets as friend or foe using the FLIR beyond three kilometers.

Knowing an airframe's capabilities and its associated strengths and weaknesses is critical to the development of task organizations. Aircraft can be assigned appropriate

tasks to accomplish during an air assault. Additionally, the analysis of capabilities helps to identify vulnerabilities that can be mitigated through effective task organization. For these reasons, the knowledge of aircraft capabilities is an important “relative constant” in the formula for selecting effective task organizations.

## **CHAPTER 4 - TACTICS, TECHNIQUES, AND PROCEDURES**

The third “relative constant” in the formula for selecting a task organization is tactics techniques and procedures. In determining the most effective air assault security task organization, it is necessary to not only understand the applicable doctrine and the capabilities of the aircraft to be employed, but also be familiar with the tactics, techniques and procedures used to accomplish the mission. The division’s current task organization and TTP for conducting air assault security have evolved over time. However, no TTP have been developed specifically for Longbow units performing the unique task of air assault security. Therefore, when selecting an air assault security team, the division must consider more than its current TTP. The division must also analyze employment methods adopted by other units with similar equipment and missions in addition to emerging TTP and concepts for weapon system employment. This study will present the division’s current TTP for air assault security as well as those emerging TTP on general Longbow employment that apply to air assault operations.

The Air Assault Division has developed standard TTP for employing combat aviation aircraft on air assault security missions, and has captured them in a comprehensive document called *The Gold Book*. In a relatively detailed manner, *The Gold Book* describes, by phase, the tasks the division assigns its combat aviation assets during air assault operations. During the staging and loading phases, the division sets the conditions for a successful air assault. It employs a combined-arms effort to confirm or deny information about itself, the terrain and weather, and the enemy.<sup>52</sup> Approximately forty-eight hours prior to the mission (“D-2”), combat aviation forces conduct terrain-oriented

route and area reconnaissance to destroy high pay-off targets of opportunity and to confirm or deny the suitability of flight routes and LZs. Additionally, these reconnoiters gain information on ground routes from LZs to the objectives, the objective area and all enemy ADA locations relative to flight routes and LZs. Upon completion of the reconnaissance, combat aviation aircraft provide their products to the AATFC for analysis.<sup>53</sup>

Twenty-four hours before the air assault (“D-1”), the division continues setting conditions with combat aviation assets conducting a force-oriented movement to contact. Its purpose is to identify and destroy enemy air defense, maneuver, fires and intelligence assets that can affect the air assault routes, LZs and objectives. By the end of the D-1 operation, all enemy forces affecting the mission should be defeated or at least targeted for attack prior to the air assault.<sup>54</sup>

On the day of the air assault (D-Day) a few hours prior to execution, combat aviation assets confirm favorable conditions with a final reconnaissance of the routes and LZs. If the LZs are hot, combat aviation assets engage the enemy in an effort to set favorable conditions, or recommend mission changes to the AATFC such as delay, divert, or abort. Once conditions are favorable or “ice”, the division executes the air assault.

During the air movement and landing phases, the division’s combat aviation assets provide direct close support to designated serials, suppressing all enemy enroute or at the LZ.<sup>55</sup> The “escort” technique used by the division entails combat aviation aircraft preceding the flight along the route, engaging forces that can affect the impending assault formation, and providing dominating fires from overwatching positions at the LZ to permit unhindered landing operations.<sup>56</sup>

Once the initial lift lands, the ground tactical phase begins, and combat aviation assets conduct screens and close combat attacks (CCA).<sup>57</sup> Screens along the perimeter of the developing airhead detect and attrit enemy forces moving toward LZs, focusing not only on ground maneuver and aviation threats but air defense weapons that can hinder the continuing air assault landings. CCA destroy designated enemy forces to permit ground forces to execute assigned tasks. As the name implies, close combat attacks are highly coordinated engagements between combat aviation and friendly ground forces, where identification of the target and the location of friendly forces are essential.

As the assault force builds combat power and subsequently moves to secure its objective, combat aviation assets support the AATFC with hasty and deliberate close combat attacks, and orchestrate other members of the joint and combined arms team such as rocket and tube artillery and close air support. Until a forward arming and refueling site is established, combat aviation teams rotate on and off station in order to provide continuous security and supporting fires as available assets allow.

When developing its air assault security task organization, the division must consider not only the TTP already established in its *Gold Book*, but other ideas on the Longbow's task organization and employment. What materials are available to the Air Assault Division now to begin drafting proposed task organizations and employment TTP in preparation for Longbow fielding?

Presently, most of the Army's emerging Longbow TTP and employment concepts come from the materiel evaluation and testing process and from the Army's first Longbow fielding cycle at Fort Hood, Texas. One of the most comprehensive sources of Longbow TTP to date is *AH-64D Longbow Apache: Tactics, Techniques and Procedural Methods of*

*Employment*, published by the Directorate of Training and Doctrine Support (DOTDS) at Fort Rucker, Alabama. This primer, originally developed to support the Longbow's Force Development Test and Experimentation, contains a broad range of information from aircraft description and weapons capabilities to crew drills and multi-ship employment procedures. Elements of this document will be incorporated into future versions of *FM 1-112, Attack Helicopter Operations*. Although not written specifically for air assault operations, some of the employment issues addressed in *Methods* are germane to air assault security missions, including: Longbow team task organizations, reconnaissance and security considerations, and actions in close operations. Reference aircraft task organizations, *Methods* advocates a Longbow team concept of one DWI as the team lead and one DWO as the wingman. This lead-wing concept provides for mutual security and support, allows flexibility, supports actions-on-contact drills, and simplifies command and control and the division of aircraft responsibilities. Teams can be formed into platoons or companies, depending upon the size of the mission.<sup>58</sup>

Regarding reconnaissance and security, *Methods* suggests leading with DWI Longbow to maximize its ability to acquire and categorize targets at standoff ranges. During reconnaissance missions, the team must preserve its freedom to maneuver, either to bypass or to engage a force once the situation is fully developed on favorable terms. For security, the FCR and the RFI provide early warning of air or ground threats to the team and the ground force once inserted. This denies an enemy the element of surprise and allows Longbow teams to engage first and from longer ranges.<sup>59</sup>

In reference to close operations, *Methods* emphasizes the extensive coordination required with ground forces in order to maximizing the Longbow's effectiveness and

minimize the risk of fratricide. Unlike deep operations where chances of fratricide are relatively lower, Longbow teams must meticulously sector engagements areas where friendly forces are in close proximity in order to safely employ the fire-and-forget capabilities of the RF Hellfire missile. Once forces are joined, positive target identification using the TADS optics and engagements with SAL Hellfire missiles is the preferred method of attack. In general, *Methods* argues that the Longbow's capabilities are degraded during close operations because of the increased coordination requirements to identifying friend and foe and the risk of fratricide.<sup>60</sup>

Another source of information on the Longbow's capabilities and some employment techniques is the *Longbow Program Review*, a briefing developed by the Training and Doctrine Command (TRADOC) System Manager (TSM) Longbow Office in July 1998. *Review* highlights some Longbow-unique qualities, such as its increased lethality with the RF Hellfire and Stinger, its greater reconnaissance area coverage using the FCR, and its enhanced survivability by combining the RFI, FCR and the RF Hellfire missile to reduce aircraft exposure time during engagements. According to *Review*, these qualities enable Longbows to operate in smaller teams, massing weapons effects instead of aircraft.<sup>61</sup> *Review* does briefly address a possible Longbow role in air assault security. It suggests that FCR-equipped Longbows could perform all required tasks from route reconnaissance and assault helicopter escort to LZ security and ground force protection upon insertion. In general, *Review* submits that the AH-64D's unique capabilities make it an effective reconnaissance platform, combined arms coordinator, and intelligence gatherer, in addition to being a devastating direct fire weapon system.<sup>62</sup>

A third source of emerging TTP on Longbow employment comes from the organization currently closest to the AH-64D discovery learning process, 1<sup>st</sup> Battalion, 227<sup>th</sup> Aviation Regiment, 1<sup>st</sup> Cavalry Division. 1-227<sup>th</sup>, the first unit to field the Longbow, has captured their innovative concepts and lessons learned in a document entitled *AH-64D Longbow Tactics, Techniques and Procedures*. *Longbow TTP* is specifically tailored to attack helicopter operations in the 1<sup>st</sup> Cavalry Division. However, many elements of *Longbow TTP* have utility in the development of air assault security TTP, including Longbow team composition, actions against enemy air defenses, reconnaissance and security operations, and close combat operations.<sup>63</sup>

*Longbow TTP* employs AH-64Ds in teams consisting of one DWI and two DWO. The aircraft normally travel in a wedge with the DWI in the lead and DWOs on its wings. In this task organization, the DWI positions forward to command and control, to provide radar security for the team, and to more easily direct actions-on-contact drills.<sup>64</sup>

*Longbow TTP* advocates using Longbow's FCR for missions 1-227<sup>th</sup> designates as "destruction of enemy air defense" (DEAD) operations. Similar in concept to suppression of enemy air defenses (SEAD), DEAD is a more lethal form of protecting aircraft from the effects of enemy air defenses because engagements are based upon actual enemy contact by Longbow, not merely intelligence analysis and templating of air defense locations.<sup>65</sup> Longbow DEAD missions are directly applicable to the D-2, D-1, and D-Day reconnaissance missions that set favorable conditions prior to an air assault.

Finally, *Longbow TTP* agrees with *Methods* that Longbow missions employed in the close fight are less than optimal and extremely high-risk. Because of the increased possibility of fratricide and the mitigating effect the situation has on the Longbow's innate

standoff capabilities, *Longbow TTP* advocates Longbows employed in close operations on exceptional, case-by-case missions only.<sup>66</sup>

A fourth source of information is the 21<sup>st</sup> Cavalry Brigade, the Army's combat aviation collective training base located at Fort Hood, Texas. 21<sup>st</sup> Cavalry receives, equips, fields, trains, evaluates and certifies all modernized attack and cavalry aviation units using a standard assessment model. To develop this model, 21<sup>st</sup> Cavalry begins with doctrinal principles, then applies successful unit-generated innovative concepts and lessons learned during each fielding cycle. In the process, 21<sup>st</sup> Cavalry develops TTP and validates and improves upon the assessment model. The brigade's Longbow Combat Aviation Training Team (CATT) has the responsibility to implement the Longbow fielding program.

The Longbow CATT leadership suggests employing a team concept of one DWI and two DWO, similar to *Longbow TTP*, except in a "v" with the DWOs in the lead. This better protects the highly valued DWI aircraft from being surprised while still affording radar coverage to the forward DWOs. Longbow CATT also suggests the complementary usage of the Longbow's FCR and its traditional optics (DVO, DTV, and FLIR) during all engagements, whether conducting deep, close or rear operations. The technique is effective at identifying targets whether engaging into an environment where fratricide risk is higher as in close operations, or where risk is lower as in deep attacks. Aircraft with traditional sensors travel forward in the team can verify the identity of FCR-generated targets.<sup>67</sup>

This discussion of tactics, techniques, and procedures serves several purposes. First, understanding the way the Air Assault Division actually executes air assault security

missions is essential to selecting the most effective task organization. Second, reviewing another units' TTP or the emerging concepts for Longbow employment presents relevant considerations for task organization courses of action including the positioning of the DWI within the flight, tasks performed by Longbows (e.g. DEAD, close combat), and the size and composition of reconnaissance and security teams. Third, the division's current TTP, coupled with the general scenario outlined in the next chapter, provide the framework for objectively analyzing and comparing the four proposed courses of action.

## **CHAPTER 5 - COURSES OF ACTION AND ANALYSIS**

With the arrival of AH-64D Longbow, the Air Assault Division must determine how to best task organize its combat aviation aircraft for maximum integration during air assault security missions. Longbow clearly possesses unique capabilities that may encourage changes to the division's traditional air assault security team. This chapter describes, analyzes and compares four courses of action for the division's air assault security team composition. The four COAs are: COA "Apache", the division's traditional task organization of pure Apache teams; COA "Longbow", a Longbow-pure task organization; COA "Warrior/Apache", a task organization of Kiowa Warrior and Apache; and COA "Warrior/Longbow", teams of Kiowa Warrior and Longbow.

The courses of action are analyzed and compared based upon the three evaluation criteria of *situational awareness*, *complementarity*, and *preserving the force*. *Situational awareness* measures how well the COA shares information to rapidly produce an accurate common operational picture. This criterion considers airframe capabilities including: the modes available to share information (voice, digital); the types of information transmitted and received (voice traffic, digital messages, graphics, video, imagery); the number of possible recipients (similar aircraft, other aircraft on the mission, ground forces and command post); and the timeliness of the information (instantaneous, near-real time, post-mission). The second criterion, *complementarity* measures how well the COA combines the forces and effects of combat aviation aircraft on the air assault mission to produce a qualitative increase in performance. As a result of complementary task organizations, one aircraft's strength can mitigate another aircraft's weakness. The AATFC achieves this

qualitative increase in effects by combining two or more forces, each supplying what is lacking in the other, to create a more potent effect. The last criterion, *preserving the force*, measures how well the COA takes all appropriate measures to preserve combat power for decisive action. To do this, the AATFC employs combat aviation aircraft to provide security and protect against the effects of the enemy's weapon systems. The criterion considers whether aircraft armament, optics, and countermeasures are optimally employed to provide the best protection for the air assault security team, the assault aircraft, and the supported ground forces.

As a general scenario for all courses of action, the division air assaults one infantry brigade task force a distance of 100 kilometers in order to seize key terrain in support of a corps counteroffensive.<sup>68</sup> Each course of action must perform air assault security tasks in accordance with the division's TTP discussion in Chapter Four. These tasks include the condition-setting reconnaissance missions, security during air movement, and supporting fires during the landing and ground tactical phases. Although the division is conducting concurrent operations that will require combat aviation assets, the brigade air assault is the division's main effort, making it the priority for resources. Enemy capabilities can threaten the air assault operation along the routes and in the vicinity of the LZs and objectives. Enemy forces are equipped with mechanized and armored vehicles, artillery, air defense artillery and surface to air missiles with associated radar, rotary and fixed wing aircraft and light infantry with small arms.

The first course of action, COA "Apache", conducts air assault security missions with the division's traditional task organization: Apaches only.<sup>69</sup> AH-64A Apaches perform all air assault security tasks such as D-2, D-1, and D-Day reconnaissance, enroute security, LZ

overwatch, CCA and outer ring security. Apaches operate in a 3-aircraft wedge formation with one AH-64A in the lead and two AH-64As on each wing.

*Situational awareness* is a disadvantage for COA “Apache”. Apache has a relatively poor information sharing capability. The AH-64A’s only mode of sharing information while in flight is voice, increasing radio transmission times and its vulnerability to jamming. Secondly, although Apache records video, ground commanders must wait until the aircraft returns from the mission to view it, making the information less timely to support the decision cycle.

*Complementarity* is also a disadvantage for COA “Apache”. The Apache-pure task organization produces no qualitative increases in weapon system effects to mitigate the airframe’s weaknesses. As a result of this segregated composition, the team still suffers from an inability to engage targets through adverse weather and obscurants due to degradation of the SAL Hellfire missile, laser and FLIR. Additionally, the Apache continues to present a large visual, acoustic, infrared, and radar signature during its reconnaissance missions. Finally, the Apache still has no ability to effectively attack or defend against rotary or fixed-wing threats.

The criterion of *preserving the force* is a slight advantage for COA “Apache”. Apache’s robust countermeasures suite and heavy armament afford excellent protection for itself, its teammates and for assault formations against ground forces. The two inadequacies this COA has in preserving the force are in combating air threats and providing security in adverse weather and through obscurants. Apache is not equipped to defeat rotary and fixed wing threats. Additionally, weather or obscuration adversely affect

the FLIR, laser and the SAL Hellfire missile. Therefore, COA “Apache” preserves the force, but with noteworthy limitations.

The second course of action, COA “Longbow”, conducts air assault security missions with a slightly different task organization of combat aviation aircraft, substituting Longbows for Apaches. Longbows operate in a three-aircraft “v” formation with two DWO traveling ahead of one DWI but at a distance within the FCR’s radar coverage. AH-64D teams perform all air assault security tasks, including D-2, D-1, and D-Day reconnaissance, enroute security, LZ overwatch, CCA and LZ screening.

*Situational awareness* is an advantage for COA “Longbow”. Longbow is equipped with a robust information sharing capacity. AH-64D transfers information via both voice and digital modes, reducing the volume of radio traffic and increasing transmission reliability and accuracy. Second, the variety of information shared (voice reports, formatted and free-text digital messages, tactical graphics, and video) provides the commander a wealth of resources from which to make decisions. Next, Longbow receives and transmits information with a number of air and ground stations, creating a large audience for shared situational awareness. Finally, Longbow sends its digital messages and video to these air and ground stations via the IDM in near-real time, making the information very timely. No longer does the commander and his staff have to wait for the aircraft to return to base before reviewing critical information captured from aircraft systems. COA “Longbow” contributes significantly to the division’s situational awareness.

In terms of *complementarity*, COA “Longbow” is a marginal advantage. Some aspects of the COA are complementary – others are not. Positioning DWOs forward in the team to

employ traditional optics (DTV, DVO, FLIR) to identify targets acquired and categorized by the FCR complements the FCR's inability to distinguish friend from foe, or determine the condition of acquired targets. Another qualitative increase to the AATF comes from the DWI's ability to reconnoiter and engage adverse weather and battlefield obscurants. However, the course of action does not mitigate the Longbow's weaknesses caused by its large visual, acoustic, infrared, and radar signature. Unfortunately, COA "Longbow" still conducts its reconnaissance missions with a large and potentially more vulnerable aircraft in the form of Longbow.

COA "Longbow" is a strong advantage regarding *preserving the force*. Longbow's survivability equipment, coupled with the DWI's target and enemy radar acquisition capabilities, provides the air assault security team and the entire AATF a robust level of warning and protection. Once detected, the air assault security team has the ordnance necessary to defeat any type of threat equipment. Furthermore, the DWOs positioned forward in the "v" afford the DWI, the team's high value asset, a level of protection from unexpected enemy encounters. Reciprocally, DWI provides radar coverage to DWOs on the team.

The third course of action, COA "Warrior/Apache", executes air assault security tasks using teams of one Kiowa Warrior and two Apaches. The aircraft form a wedge with OH-58D(I) in the lead, and the Apaches behind as wingmen. These scout-gun teams perform the D-2, D-1, and D-Day reconnaissance missions. During the air movement phase, AH-64As alone conduct "escort" duties immediately preceding the flight during ingress and egress. Similarly, only AH-64As provide overwatch for the landing phase and CCA during the beginning of the ground tactical phase. OH-58D(I)s arrive immediately after

the initial air assault lift to begin outer ring security and reconnaissance. AH-64As stage out of LZs to provide on-call CCA to ground forces or Kiowa Warriors.

*Situational awareness* is an advantage in COA “Warrior/Apache”. Although Apache is limited in its information sharing capabilities, Kiowa Warrior compensates with both voice and digital modes of communication. Like the AH-64D, OH-58D(I) receives and transmits a variety of information from voice reports and formatted and free-text digital messages, to Photo-Telesis imagery. Kiowa Warrior shares TACFIRE protocol digital information with a number of air and ground stations, although not with its air assault security teammate, Apache. Finally, information timeliness ranges from near-real time digital messages and slightly slower Photo-Telesis image transfer rates, to post-mission AH-64A and OH-58D(I) video reviewing.

*Complementarity* is an advantage to COA “Warrior/Apache”. Kiowa Warrior and Apache have several complementary systems that provide qualitative improvements in the team’s effects. Kiowa Warrior complements Apache weaknesses by providing an air threat engagement capability in the ATAS, introducing digital communications to the Apache team, and reducing the teams signature by leading with the stealthier Kiowa Warrior.<sup>70</sup> Conversely, the Apache complements the Kiowa Warrior with heavier ordnance and by conducting those air assault security tasks requiring speed comparable to the assault formations (e.g. “escort” during air movement, and LZ overwatch during the landing phase.). This task organization does not, however, mitigate the weaknesses both aircraft have with degraded engagements during adverse weather and through obscuration, nor does it compensate for the Kiowa Warrior’s lack of extended range fuel tanks.

COA “Warrior/Apache” is an advantage considering the criterion of *preserving the force*. Placing the stealthier OH-58D(I) forward in the security team protects the larger Apache and reduces the team’s initial signature. OH-58D(I) ATAS protects the air security team, the assault aircraft and the ground forces from fixed and rotary wing threats. Apache’s heavy ordnance provides excellent protection for the more lightly armed OH-58D(I), as well as the other members of the AATF.

The fourth course of action, COA “Warrior/Longbow”, executes air assault security with teams of one OH-58D(I) and two AH-64Ds. One OH-58D(I) leads, followed by a DWI Longbow, and one DWO in trail. This composition conducts the D-2, D-1 and D Day reconnaissance missions. Team composition changes to a Longbow “v” of two DWO and one DWI for “escort” duties during the air movement phase, LZ overwatch during landing, and CCA for the beginning of the ground tactical phase. After the initial air assault insertion, OH-58D(I)s arrive and link up with a DWI and DWO to perform outer ring security and reconnaissance. Additional Longbow DWO support with CCA staged out of the LZs.

*Situational awareness* is a strong advantage for COA “Warrior/Longbow”. Both the Longbow and the Kiowa Warrior have advanced information-sharing systems. Each aircraft has both voice and digital modes of communicating. Second, between the two airframes, COA “Warrior/Longbow” offers a wide spectrum of information including voice reports, formatted and free-text digital messages, tactical graphics, video, and imagery. Because their digital system protocols are different, Longbow and Kiowa Warrior have limitations (specific message sets and reduced transfer rate) in digital communications between themselves. However, these same incompatibilities allow their

team to communicate with more air and ground stations, using both TACFIRE and LONGBOW protocols. Finally, Longbow and Kiowa Warrior send and receive their information in near-real time, except as previously indicated with OH-58D(I) and Photo-Telesis. The highly developed capabilities of the AH-64D and the OH-58D(I) make *situational awareness* in COA “Warrior/Longbow” a clear advantage.

*Complementarity* is also a strong advantage to COA “Warrior/Longbow” because of the qualitative increases in effects the team produces. Longbow’s FCR and RF allow reconnaissance and engagements during adverse weather or through battlefield obscuration, thus mitigating Kiowa Warrior’s weakness caused by the degradation of its Hellfire and laser in similar conditions. Additionally, Longbow’s heavier armament configuration complements Kiowa Warrior’s light ordnance load. As in COA “Warrior/Apache”, Longbows will perform those tasks requiring quickness, thereby complementing Kiowa Warrior’s weakness in speed. With minimal exceptions such as Kiowa Warrior’s lack of extended range tanks, COA “Warrior/Longbow” produces a task organization with exceptional complementarity.

*Preserving the force* is another advantage of COA “Warrior/Longbow”. The team’s aircraft positioning places the smaller, less observable OH-58D(I) forward of the larger and high-value DWI Longbow, while the DWO protects the rear of the DWI. The DWI’s FCR, RFI and heavy ordnance also provide security to the lead OH-58D(I) and a radar detection “umbrella” to the entire team. DWI also provides the entire force protection during adverse weather and through battlefield obscurants. COA “Warrior/Longbow” provides both variety and quantity in terms of armament and optics in protecting the AATF’s air and ground forces.

For comparison, the different task organizations are rank-ordered against each other by individual evaluation criteria. This comparison rank-orders each sub-element of a criterion as well (e.g. “number of recipients” for the criterion *situational awareness*.) The course of action’s score from the evaluation criteria comparison is totaled and compared to the other totals. The lowest total score is considered the most effective course of action. No criterion was weighted over another. (See COA Comparison Table in endnotes.)<sup>71</sup>

In terms of *situational awareness*, COA “Warrior/Longbow” is the superior task organization. The Kiowa Warrior and Longbow team shares more types of information (voice, digital messages, imagery, video, graphics) with its collective recipients than any other task organization. Also, the team can communicate with the most recipients by accessing both TACFIRE and LONGBOW protocol stations. Comparing the timeliness of the information shared, “Warrior/Longbow” and “Longbow” produce the same near-real time transfer rates, while COA “Warrior/Apache” lags behind slightly with its slower TACFIRE and Photo-Telesis transfer rates. Finally, COAs “Warrior/Longbow”, “Longbow” and “Warrior Apache” all share information through voice and digital modes. Overall, the runner-up course of action for *situational awareness* is “Longbow”. “Warrior/Apache” is third and “Apache” is the least effective for this criterion.

From the standpoint of *complementarity*, COA “Warrior/Longbow” is the best task organization. The combination of Longbow and Kiowa Warrior’s unique and complementary capabilities serve to mitigate the most aircraft weaknesses. The unanswered weakness of the Kiowa Warrior’s lack of an external fuel tank is mitigated by logistics measures (e.g. positioning a temporary refueling point), not by task organization selection. “Longbow” is the second best task organization for complementarity. Its major

unanswered weakness is the Longbow's relatively large visual, acoustic, infrared, and radar signature. "Warrior/Apache" is the next most complementary team composition, although unable to mitigate the team's engagement degradation caused by adverse weather and obscuration. "Apache" is the least complementary; no Apache weaknesses are relieved.

Finally, "Warrior/Longbow" is the most effective COA at *preserving the force*. Longbow's tracking and engagement capability during adverse weather and through obscuration provides enhanced protection to itself, the air assault security team and AATF ground forces. Furthermore, the Kiowa Warrior's stealthier design reduces the team's signature and vulnerability to detection. COA "Longbow" is second-ranked, possessing the same adverse weather and obscuration-mitigating capabilities to protect the force, but lacking the signature reduction from the OH-58D(I). COA "Warrior/Apache" is the third best task organization, protecting the air assault security team adequately, but lacking the capabilities to provide the AATF effective fires during poor environmental conditions. COA "Apache" is last, attributed to the lack of air threat protection, adverse weather and obscuration degradations, and the relatively large airframe signatures.

By an overall comparison of the four courses of action analyzed, COA "Warrior/Longbow" is the superior task organization based upon the evaluation criteria. This task organization, consisting of one OH-58D(I), one AH-64D Longbow with FCR (DWI) and one AH-64D Longbow without FCR (DWO), provides the division the best situational awareness options, the most complementary air assault security team composition, and the greatest protection of the entire AATF. The other COAs in order of merit are: COA "Longbow", COA "Kiowa/Apache" and COA "Apache".

## **CHAPTER 6 - CONCLUSION**

The air assault of an infantry brigade task force over 100 kilometers into enemy territory at night traveling at speeds in excess of 200 kilometers per hour 200 feet above the ground in large multi-ship helicopter formations is a highly complex operation. Just as complex is the formula for selecting the most effective task organization of combat aviation aircraft to help set the conditions for success prior to the air assault, to provide the air assault task force security enroute, and to support the ground force with responsive fires as it achieves its objectives. Many of the variables that go into the analysis of task organization selection are situational dependent. Mission specifics, the enemy confronted, the terrain and weather associated with the operations, the forces and equipment allocated, the time available and other factors cannot be pre-determined. However, some factors that do weigh into the air assault security team selection process are relatively constant. The employment doctrine for combat aviation aircraft on air assault security missions, the capabilities of the airframes, and the tactics, techniques and procedures the unit has developed over time are all relatively static elements of the formula for determining team composition. Additionally, emerging concepts and lessons learned from other like organizations provide insights into developing an effective task organization.

The 101<sup>st</sup> Airborne Division (Air Assault) presently has a variety of options from which to select the best task organization of combat aviation aircraft for providing security to an air assault task force. Its current combat aviation aircraft, the AH-64A Apache and the OH-58D(I) Kiowa Warrior, have unique characteristics that can accomplish the tasks

associated with air assault security. Beginning in October 1999, the division will have even more options as its three attack helicopter battalions start fielding the AH-64D Longbow, the U.S. Army's most advanced attack helicopter. Equipped with significant technological improvements, the Longbow provides enhanced capabilities to both aviation and ground forces. And when effectively integrated into the division's existing force structure and employment techniques, AH-64D will have the synergistic effect of increasing the Air Assault Division's efficacy. The challenge will be to optimize the employment of all three combat aviation aircraft in order to maximize each airframe's strengths and minimize its weaknesses.

To meet the challenge, this study proposed four different combat aviation teams that could be used as building blocks with which to construct a complete air assault security task organization. The teams ranged in composition from single to multiple types of aircraft, and from current to newly fielded systems. Published doctrine and emerging TTP also factored into the selection of aircraft mixes within the four options. Each course of action employed the division's current tactics, techniques and procedures as outlined in the employment guide, *The Gold Book*. Set within a general scenario, each task organization option was analyzed using three evaluation criteria: *situational awareness*, *complementarity*, and *protecting the force*. Courses of action were compared and rank-ordered relative to evaluation criteria, then rank-ordered overall.

The overall comparative analysis determined the most effective course of action: COA "Warrior/Longbow." An air assault security task organization comprised of AH-64D Longbows and OH-58D(I) Kiowa Warriors optimizes each airframes capabilities, thereby contributing the most to division's situational awareness, reinforcing the strengths and

complementing the weaknesses of the air assault security team, and providing the greatest protection to the air assaulting force.

This study draws three conclusions. First, properly task-organized air assault security teams have enormous potential to contribute to the division's situational awareness during air assault operations. Today's modernized combat aviation aircraft are designed and upgraded with greater capabilities to share situational awareness. Units must select aircraft task organizations that take advantage of the aircraft's information sharing capacity. Second, integrated team compositions leverage the capabilities of one airframe to complement the limitations of another. Despite the significant strengths generated by AH-64D Longbow's technological enhancements, it still possesses weaknesses. The synergistic effect produced by task organizing security teams reinforces the team's strengths while mitigating its weaknesses. Third, shared situational awareness and complementarity of aircraft capabilities significantly improves the force protection of the division's aircraft and the assaulting ground element. Force protection is of particular importance to Longbows equipped with the Fire Control Radar. These DWI Longbows are central to the enhanced capabilities of the Longbow battalion. With only nine DWI assigned to each battalion, protecting these high-value assets is crucial.

As a result of the analysis and conclusions, the research has several implications for the Air Assault Division. First, the task organizing of air assault security teams requires deliberate forethought, training and discovery learning. Innovative task organizations are the result of thoughtful analysis and a firm understanding of the variables and relative constants that effect team composition. Leaders must carefully consider not just the immediate benefits of forming a new task organization (e.g. situational awareness,

complementarity, force preservation). They must anticipate second and third order effects such as complexities in command and control, logistics, and aircraft system compatibility as well.<sup>72</sup> Task organized teams also require training to become effective. The crews must practice the TTP they expect to employ in combat. This training builds habitual relationships and confidence, educates members on airframe strengths and weaknesses, and facilitates the development of new standing operating procedures that incorporate emerging employment methods. Last, the thought and training required to develop effective task organizations will encourage future discovery learning of even more efficient ways to provide air assault security. As an added benefit, the pursuit of better task organizations reinforces a teamwork ethic and promotes the sharing of information and ideas between organizations.

The second implication for the Air Assault Division is the natural extension of this task organization study to revisions in TTP. The data presented and the conclusions drawn from this study could prompt the refinement of the division's air assault security TTP. For example, because of the Longbow's enhanced optics, increased lethality, and advanced information sharing systems, the division may be able to reduce the time and reconnaissance iterations currently required to set the conditions for a successful air assault. This measure would decrease the risk to combat aviation aircraft, free up assets to conduct other missions, and increase the surprise and shock effective by preserving operational security. This is only one example of how the TTP could be refined in light of the Longbow fielding.

A third implication this analysis has for the division is in the frequency of procedural reviews. The reassessment of task organizations and TTP should not be deferred until the

occurrence of a profound force modernization initiative like the fielding of the AH-64D Longbow. The division's current equipment receives periodic modifications and upgrades, the impact of which must be examined to insure the most optimal employment techniques are performed. Furthermore, as the Longbow fielding process progresses, the division can continue to draw insights from lessons learned by other units dealing with similar task organization and employment issues.

The 101<sup>st</sup> Airborne Division (Air Assault) is approaching an exciting time of change as its first attack helicopter battalion of AH-64D Longbows returns to Fort Campbell in October 1999. In addition to visualizing the integration of the Longbow's enhanced capabilities, the division is reviewing the current capabilities and employment techniques of its existing combat aviation aircraft, as evidenced by the integration of OH-58D(I) and AH-64A during a fielding training exercise in the fall of 1998.<sup>73</sup> In this spirit of introspection and organizational improvement, the division's leaders are already asking themselves: "how can the Air Assault Division most effectively task organization its combat aviation aircraft during air assault security missions once AH-64D Longbow fielding begins?" The answer is Longbow and Kiowa Warrior.

## ENDNOTES

<sup>1</sup> These dates reflect the entire fielding process. The process begins when units turn in their Apaches to Mesa, Arizona for retrofitting. It continues with fielding preparation such as qualification training and support equipment issue. It culminates with collective training at Fort Hood, Texas. The complete fielding process is over a year long. In October 1999, the division's first battalion to transition to the Longbow (2-101<sup>st</sup> Aviation Regiment) returns to Fort Campbell from its collect training phase at Fort Hood, Texas. This starts the transition period when the Air Assault Division has Apaches, Longbows, and Kiowa Warriors. The transition period ends in July 2001 when the division's last attack battalion (3-101<sup>st</sup>) turns in its Apaches in preparation for the Longbow transition. Training and Doctrine Command System Manager (TSM) Longbow, *Longbow Program Review* (Fort Rucker, AL: Department of the Army, 31 July 1998), 54.

<sup>2</sup> Although less of a constant than doctrine and airframe capabilities, TTP do not usually change from mission to mission like the situational-dependent variables of enemy, terrain, time, etc. They do, however, evolve over time, and are expected to do so after Longbow is initially fielded.

<sup>3</sup> These emerging concepts helped define the different task organization options analyzed in this study. They may also contribute to the future evolution of the division's TTP for employing the Longbow.

<sup>4</sup> U.S. Army, *FM 100-5, Operations* (Washington, DC: Department of the Army, June 1998), 3.

<sup>5</sup> *Ibid.*, 2-15.

<sup>6</sup> *Ibid.*, 5-23.

<sup>7</sup> U.S. Army, *FM 101-5-1, Operational Terms and Graphics* (Washington, DC: Department of the Army, September 1997), 1-4.

<sup>8</sup> This airspeed represents the maximum velocity sustained during the flight. The estimate time enroute of the AATF considers all airspeed profiles including slower rates during take-off, landing, and enroute maneuvering.

<sup>9</sup> Terrain can be used to enhance the security of air assault forces. Air routes should be planned to take advantage of masking terrain or cover. Aircraft performing high-speed contour flight over forests or jungle minimize their exposure to ground fire, which reduces the amount of air assault security requirement. U.S. Army, *FM 1-112, Attack Helicopter Operations* (Washington, DC: Department of the Army, April 1997), B-4.

<sup>10</sup> U.S. Army, *FM 1-112*, B-1.

---

<sup>11</sup> Ibid., B-4.

<sup>12</sup> U.S. Army, *FM 90-4, Air Assault Operations* (Washington, DC: Department of the Army, 16 March 1987), 3-36

<sup>13</sup> U.S. Army, *FM 1-112*, B-9.

<sup>14</sup> U.S. Army, *FM 90-4, Air Assault Operations* (Washington, DC: Department of the Army, March 1987), 3-26.

<sup>15</sup> U.S. Army, *FM 1-112*, B-9.

<sup>16</sup> U.S. Army, *FM 90-4*, Pg 3-11.

<sup>17</sup> U.S. Army, *FM 1-112*, B-10.

<sup>18</sup> U.S. Army, *FM 90-4*, A-6.

<sup>19</sup> Ibid., 3-8.

<sup>20</sup> U.S. Army, *FM 1-112*, B-11.

<sup>21</sup> U.S. Army, *FM 90-4*, 3-7.

<sup>22</sup> U.S. Army, *FM 1-112*, B-6.

<sup>23</sup> U.S. Army, *FM 1-111, Aviation Brigades* (Washington, DC: Department of the Army, December 1997), 1-10.

<sup>24</sup> The AH-64A carries a variety of combinations of ordnance, dependent upon the mission profile. Apache can always can 1200 rounds of 30 mm. The aircraft has four weapons racks, and each rack can carry 4 Hellfire missiles, or 19 2.75" rockets, or an external fuel pod. U.S. Army, *FM 1-112*, A-5.

<sup>25</sup> U.S. Army, *FM 1-112*, A-1.

<sup>26</sup> Ibid., A-3.

<sup>27</sup> For a discussion on Aircraft Survivability Equipment, see U.S. Army, *TM 55-1520-238-10, Operator's Manual for Army AH-64A Helicopter* (Washington, DC: Department of the Army, 28 April 1996), 4-69; for communications information, see Ibid., 3-1.

<sup>28</sup> U.S. Army, *LNO Handbook*, 80.

---

<sup>29</sup> Training and Doctrine Command System Manager (TSM) Comanche, *RAH-66 Comanche Information Brief* (Fort Rucker, AL: Department of the Army, 6 August 1998), 10.

<sup>30</sup> U.S. Army, *LNO Handbook*, 80.

<sup>31</sup> U.S. Army, *FM 1-112*, A-6.

<sup>32</sup> *Ibid.*, A-9.

<sup>33</sup> Maximum ordnance for any one type of weapon system is: 4 Hellfires, or 4 Stingers, or 14 Rockets or 150 rds of .50 caliber. For possible combinations of ordnance, see U.S. Army, *TM 55-1520-248-10, Operator's Manual for Army OH-58D Helicopter* (Washington, DC: Department of the Army, June 1996), 6-10.

<sup>34</sup> U.S. Army, *TRADOC Pamphlet 34-3, Joint Laser Designation Procedures* (Washington, DC: Department of the Army, 11 December 1985), Appendix A.

<sup>35</sup> TSM Comanche, *RAH-66 Comanche Information Brief*, 10.

<sup>36</sup> Commander, U.S. Army Aviation Center, *LNO Handbook* (Fort Rucker, AL: U.S. Army Aviation Warfighting Center, undated), 82.

<sup>37</sup> Neil A. Reilly, Captain, Assistant Operations Officer, 2<sup>nd</sup> Squadron, 17<sup>th</sup> Cavalry Regiment, interview by author, 20 November 1998, telephonic conversation, Fort Leavenworth, Kansas.

<sup>38</sup> Commander, U.S. Army Aviation Center, *LNO Handbook* (Fort Rucker, AL: U.S. Army Aviation Warfighting Center, undated), 82.

<sup>39</sup> Training and Doctrine Command System Manager (TSM) Longbow, *Longbow Program Review* (Fort Rucker, AL: Department of the Army, 31 July 1998), 26.

<sup>40</sup> TSM Longbow, *Longbow Review*, 31.

<sup>41</sup> Longbow Battalion's have 9 FCR-equipped AH-64D's, and the other 15 aircraft have the necessary mounts and cabling to receive an FCR, if necessary. 1<sup>st</sup> Battalion, 227<sup>th</sup> Aviation Regiment, *AH-64D Longbow Tactics, Techniques, and Procedures*, (Fort Hood, TX: Department of the Army, 8 October 1998), i.

<sup>42</sup> Mark Evans, Major, Chief, Longbow Combat Aviation Training Team, 21<sup>st</sup> Cavalry Brigade, Fort Hood, Texas, interview by author, 3 December 1998, telephonic conversation, Fort Leavenworth, Kansas.

<sup>43</sup> TSM Longbow, *Longbow Review*, 31.

---

<sup>44</sup> TSM Longbow, *Longbow Review*, 23.

<sup>45</sup> John D. Williams, Major, Operations Officer, 1<sup>st</sup> Battalion, 227<sup>th</sup> Aviation Regiment, interview by author, September – November 1998, electronic mail, Fort Leavenworth, Kansas.

<sup>46</sup> A limited test was conducted using the OH-58D(I) and the Longbow Ground Station Module. Messages including free text, Hellfire call-for-fire, and situation reports were successfully passed from OH-58D(I) to the Longbow Ground Station Module. Mark Evans, interview by author, 3 December 1998.

<sup>47</sup> DOTDS, *Methods of Employment*, 48.

<sup>48</sup> 1-227, *AH-64D TTP*, ii.

<sup>49</sup> Department of Training and Doctrine Support (DOTDS), *AH-64D Longbow Apache: Tactics, Techniques and Procedural Methods of Employment* (Fort Rucker, AL: U.S. Army Aviation Center, n.d.), 25.

<sup>50</sup> U.S. Army, *FM 101-5-1*, 1-24.

<sup>51</sup> It is the author's opinion that all AH-64D should be DWIs. Notwithstanding budgetary constraints, Longbow battalions would be more effective having all DWI. Afterall, Cobra units transitioned all their AH-1s to AH-64As. OH-58D(I)'s all have mast mounted sites and armament pylons, not some armed and some not. In the future, Comanche units will be similarly constrained with two versions of RAH-66, DWI and DWO, thus significantly reducing the warfighter's efficacy.

<sup>52</sup> 101<sup>st</sup> Airborne Division (Air Assault), *Gold Book: Tactics, Techniques, and Procedures for Air Assault Operations* (Fort Campbell, KY: Department of the Army, 10 February 1998), 5-1.

<sup>53</sup> Ibid., 5-20.

<sup>54</sup> Ibid., 5-21.

<sup>55</sup> Ibid., 5-22.

<sup>56</sup> Ibid., 5-21.

<sup>57</sup> Ibid.

<sup>58</sup> DOTDS, *Methods of Employment*, 25.

<sup>59</sup> Ibid., 37.

---

<sup>60</sup> Ibid.

<sup>61</sup> TSM Longbow, *Longbow Review*, 17.

<sup>62</sup> Ibid., 34.

<sup>63</sup> John D. Williams, interview by author, September – November 1998.

<sup>64</sup> 1-227, *AH-64D TTP*, 2.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid., 17.

<sup>67</sup> Mark Evans, interview by author, 3 December 1998.

<sup>68</sup> For this comparative analysis, the air assault distance is within the speed and range limitations of the Kiowa Warrior. For extended distances, extraordinary measures such as additional refueling sites must be established to make Kiowa Warrior employment practical. This variation of TTP is beyond the scope of the study.

<sup>69</sup> Although *The Gold Book* TTP suggest that either Kiowa Warriors or Apaches can perform the tasks, the Air Assault Division traditionally has assigned the air assault security mission completely to AH-64A attack helicopter battalions. For a variety of reasons including Kiowa Warrior's insufficient speed and range to support typical air assaults, the division has not integrated OH-58D(I) Kiowa Warriors into the air assault security role. Instead, the division generally employs Kiowa Warriors on typical cavalry missions such as reconnaissance, security, and intelligence gathering across the division's battlespace. This insight is drawn from 7 years of personal experience serving in an attack helicopter battalion within the division and after confirmation with a battalion executive officer and battalion operations officer currently assigned to an attack helicopter battalion in the 101<sup>st</sup> Aviation Brigade. Larsen, Jon A., Major, Executive Officer, 2<sup>nd</sup> Battalion, 101<sup>st</sup> Aviation Regiment, interview by author, 10 November 1998, telephonic conversation, Fort Leavenworth, Kansas; Smith, Stephen, Major, Operations Officer, 2<sup>nd</sup> Battalion, 101<sup>st</sup> Aviation Regiment, interview by author, 23 September 1998, telephonic conversation and electronic mail, Fort Leavenworth, Kansas.

<sup>70</sup> During the Division Advanced Warfighter Experiment in December 1997, 1<sup>st</sup> Battalion 4<sup>th</sup> Aviation Regiment came to a similar conclusion about the employment of combat aviation aircraft for their particular missions. 1-4 Aviation fought the exercise using AH-64D Longbow and RAH-66 Comanche, the future successor of the OH-58D(I) Kiowa Warrior. 1-4 Aviation discovered that by maneuvering Comanche out front to find the enemy, Longbow could "pile on at the critical time and place." Douglas Eller, "Attack Helicopter Operations during the Division Advanced Warfighter Experiment: A Foxhole Perspective" (Fort Leavenworth, KS: Center for Army Lessons Learned, accessed 10 August 1998); available from <http://call.army.mil/call/nftf/janfeb98/attack.htm>; Internet

<sup>71</sup> Course of Action Comparison Table.

COA Evaluation Criterion	Apache	Longbow	Warrior/Apache	Warrior/Longbow
<b>“Situational Awareness”</b>				
Modes of Information Sharing (Voice,Digital)	4	2	2	2
Type of Information (Voice Reports, Messages, Imagery, Video,Graphics)	4	2	3	1
Number of Recipients that can receive and transmit data	4	2	3	1
Timeliness of Information Sent (instantaneous, near real time, post-mission.)	4	<u>1.5</u>	<u>3</u>	<u>1.5</u>
	12 (4 <sup>th</sup> )	7.5 (2 <sup>nd</sup> )	11 (3 <sup>rd</sup> )	7.5 (1 <sup>st</sup> )
<b>“Complementarity”</b>				
Mitigates Aircraft Weaknesses	4(4 <sup>th</sup> )	2	3	1
<b>Preserving the Force</b>				
Protects Self	4	2	2	2
Protects Aaslt Security Team	4	2.5	2.5	1
Protects Assault Aircraft	4	2	3	1
Protects Ground Forces	3.5	2	3.5	1
	15.5 (4 <sup>th</sup> )	8.5 (2 <sup>nd</sup> )	11 (3 <sup>rd</sup> )	5 (1 <sup>st</sup> )
<b>TOTAL</b>	31.5	17.5	27	13.5
<b>RANK ORDER</b>	<b>4th</b>	<b>2<sup>nd</sup></b>	<b>3rd</b>	<b>1st</b>

<sup>72</sup> Second and third order effects are the unintended consequences of a decision that unwittingly manifest themselves during the implementation of a decision. Often a decision for the sake of first orders without considering future repercussions.

<sup>73</sup> Per conversation with CPT Riley Assistant S3, 2-17<sup>th</sup> Cavalry and MAJ John Larson, S3, 2-101<sup>st</sup> Aviation Regiment. 2-17<sup>th</sup> Cav conducted a field exercise where Apache and Kiowa Warrior teams were employed to analyze the task organization concept. Additionally, the Air Assault Division experimented with different task organization mixes including Longbows and Kiowa Warriors during a recent Warfighter Exercise.

## BIBLIOGRAPHY

### Articles in Journals and Magazines

- Ahearn, David L., Robert M. Cumbie, Jennifer A. Henderson. "Army Aviation and the Digital Battlefield." *Army Aviation*, 28 February 1995, 21.
- Douglas Eller. "Attack Helicopter Operations during the Division Advanced Warfighter Experiment: A Foxhole Perspective." (Fort Leavenworth, KS: Center for Army Lessons Learned, accessed 10 August 1998); available from <http://call.army.mil/call/nftf/janfeb98/attack.htm>; Internet.
- Eno, Paul A. "Moving the Mountain: Achieving Successful Hellfire Engagements in the Rugged Terrain of Korea." (Fort Leavenworth, KS: Center for Army Lessons Learned, accessed 10 August 1998); available from <http://call.army.mil/call/nftf/novdec97/sect5.htm>; Internet.
- Hansen, John T. "Air Assault Security: A Procedural Review." *U.S. Army Aviation Digest*, January 1993, 54.
- Steele, Dennis. "The Longbow Apache Reports for Duty." *Army Magazine*, August 1998, 26.
- Vozzo, Pete and Larry Niver. "Longbow Apache." *U.S. Army Aviation Digest*, November 1995, 2.

### Books

- Senge, Peter M. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Currency Doubleday, October 1994.
- Waldrop, M. Mitchell. *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York: Touchstone, 1992.

### Briefings and Speeches

- Training and Doctrine Command System Manager (TSM) Longbow. *Longbow Program Review*. Information Briefing. Fort Rucker, AL: Department of the Army, 31 July 1998.
- Commander, 3<sup>rd</sup> Brigade, 101<sup>st</sup> Airborne Division (Air Assault). *Brigade Air Assault Operations*. Information Briefing. Fort Campbell, KY: Department of the Army, 27 August 1998.

### Government Publications

- U.S. Army. *ARTEP 1-419-30-MTP, Mission Training Plan for the Target Acquisition and Reconnaissance Company.* Washington, DC: Department of the Army, 30 September 1993.
- U.S. Army. *ARTEP 1-385-MTP, Mission Training Plan for the Attack Helicopter Battalion.* Washington, DC: Department of the Army, 3 October 1993.
- U.S. Army. *FM 17-95, Cavalry Operations.* Washington, DC: Department of the Army, 24 December 1996.
- U.S. Army. *FM 1-111, Aviation Brigades.* Washington, DC: Department of the Army, 27 October 1997.
- U.S. Army. *FM 1-112, Attack Helicopter Operations.* Washington, DC: Department of the Army, April 1997.
- U.S. Army. *FM 1-116, Air Cavalry/Reconnaissance Troop.* Washington, DC: Department of the Army, 20 February 1991.
- U.S. Army. *FM 71-100, Division Operations.* Washington, DC: Department of the Army, 28 August 1996.
- U.S. Army. *FM 71-100-3, Air Assault Division Operations.* Washington, DC: Department of the Army, June 1996.
- U.S. Army. *FM 90-4, Air Assault Operations.* Washington, DC: Department of the Army, 16 March 1987.
- U.S. Army. *FM 100-5, Operations: Revised Final Draft.* Washington, DC: Department of the Army, 19 June 1998.
- U.S. Army. *FM 100-15, Corps Operations.* Washington, DC: Department of the Army, 1996.
- U.S. Army. *FM 101-5-1, Operational Terms and Graphics.* Washington, DC: Department of the Army, 30 September 1997.
- U.S. Army. *TC 1-209, Aircrew Training Manual, Observation Helicopter, OH-58D, Aviator/Aeroscout Observer.* Washington, DC: Department of the Army, 9 December 1992.
- U.S. Army. *TC 1-214, Aircrew Training Manual, Attack Helicopter, AH-64A.* Washington, DC: Department of the Army, 20 May 1992.

U.S. Army. *TC 1-251, Aircrew Training Manual, Attack Helicopter, AH-64D*. Washington, DC: Department of the Army, 4 August 1992.

U.S. Army. *TM 55-1520-248-10, Operator's Manual for Army OH-58D Helicopter*. Washington, DC: Department of the Army, June 1996.

U.S. Army. *TM 55-1520-238-10, Operator's Manual for Army AH-64A Helicopter*. Washington, DC: Department of the Army, 28 April 1996.

U.S. Army. *TRADOC Pamphlet 34-3, Joint Laser Designation Procedures*. Washington, DC: Department of the Army, 11 December 1985.

U.S. Army. *Weapon Systems 1998*. Washington, DC: Department of the Army, 1998.

### Interviews

Evans, Mark, Major, Chief, Longbow Combat Aviation Training Team, 21<sup>st</sup> Cavalry Brigade, Fort Hood, Texas. Interview by author, 3 December 1998. Telephonic conversation. Fort Leavenworth, Kansas.

Gass, Greg P., Lieutenant Colonel, Commander, 2<sup>nd</sup> Battalion, 101<sup>st</sup> Aviation Regiment, 101<sup>st</sup> Airborne, Division (Air Assault), Fort Campbell, Kentucky. Interview by author, 5 August 1998. Electronic mail. Fort Leavenworth, Kansas.

Hubbard, Samuel J., Jr., Colonel, Commander, 101<sup>st</sup> Aviation Brigade, 101<sup>st</sup> Airborne Division (Air Assault), Fort Campbell, Kentucky. Interview by author, 22 October 1998. Electronic mail. Fort Leavenworth, Kansas.

Larsen, Jon A., Major, Executive Officer, 2<sup>nd</sup> Battalion, 101<sup>st</sup> Aviation Regiment. Interview by author, 10 November 1998. Telephonic conversation. Fort Leavenworth, Kansas.

Reilly, Neil A., Captain, Assistant Operations Officer, 2<sup>nd</sup> Squadron, 17<sup>th</sup> Cavalry Regiment. Interview by author, 20 November 1998. Telephonic conversation. Fort Leavenworth, Kansas.

Smith, Stephen, Major, Operations Officer, 2<sup>nd</sup> Battalion, 101<sup>st</sup> Aviation Regiment. Interview by author, 23 September 1998. Telephonic conversation and electronic mail. Fort Leavenworth, Kansas.

Williams, John D., Major, Operations Officer, 1<sup>st</sup> Battalion, 227<sup>th</sup> Aviation Regiment. Interview by author, September – November 1998. Electronic mail. Fort Leavenworth, Kansas.

### Monographs, Manuscripts, Unpublished Papers

- Ferrell, D. Mark. "Brilliant Weapon: Fighting the Longbow Apache." MMAS Thesis. Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1992.
- Smith, Stephen C. "Is There a Role for Attack Helicopters in Peace Operations?" MMAS Thesis. Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1998.
- Stockhausen, Richard C. "Longbow, Comanche, and the Aviation Restructure Initiative: Tactical Implications for the Heavy Division Attack Helicopter Battalion?" SAMS Monograph. Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1995.
- Williams, John D. "AH-64D Longbow Helicopter Gunnery Training Strategy", MMAS Thesis. Fort Leavenworth, KS: US Army Command and General Staff College, 1997.

### Other Sources

- Commander, 1<sup>st</sup> Battalion, 227<sup>th</sup> Aviation Regiment. *AH-64D Longbow Tactics, Techniques, and Procedures: Version 3*. Fort Hood, TX: Department of the Army, 10 October 1998.
- Commander, 101<sup>st</sup> Airborne Division (Air Assault). *Gold Book: Tactics, Techniques, and Procedures for Air Assault Operations*. Fort Campbell, KY: Department of the Army, 10 February 1998.
- Commander, U.S. Army Aviation Center. *LNO Handbook*. Fort Rucker, AL: U.S. Army Aviation Warfighting Center, n.d.
- Director, Directorate of Training and Doctrine Support. *AH-64D Longbow Apache Tactics, Techniques, and Procedural Methods of Employment*. Fort Rucker, AL: U.S. Army Aviation Warfighting Center, n.d.